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CRUISE REPORT

R/V GYRE

80-G-9F1

September 18 - October 14, 1980

Peter Popenoe U.S. Geological Survey Woods Hole, Massachusetts 02543 Cruise Report R/V GYRE (80-G-9)

Ship name: R/V GYRE

Cruise name: 80-G-9 Legs 1, 2, and 3

Project: South Atlantic OCS Environmental Assessment (BLM)

Areas of operation:

Leg 1 Continental Slope, Cape Hatteras area, North Carolina.

Leg 2 Continental Shelf, slope, and rise, Virginia state line to Cape Hatteras. Data included a tie line running south through ASP-7 and -8, AMCOR 6006, ASP-5, and south to ISELIN line 25-26.

Leg 3 Straits of Florida, Vero Beach to Miami.

Dates and ports:

Leg 1 left Little Creek, Norfolk, VA 1045 EDT September 18, 1980. Arrived Little Creek, Norfolk, VA 1700 EDT September 25, 1980.

Legs 2-3 left Little Creek, Norfolk, VA 1600 EDT September 26, 1980. Arrived Miami, FL 0100 EDT (Dodge Island) October 14, 1980.

Scientific party:

Leg 1 Mid-range sidescan sonar

| Peter Popenoe | USGS | Chief scientist |
|--------------------|-----------------------|-------------------------|
| Kathy Cashman | USGS | Co-chief scientist |
| | | |
| Peter Popenoe | USGS | Navigation |
| James Dodd | USGS | Navigation |
| Barry Irwin | USGS | Navigation |
| Irv Bjorkheim | International Sub- | Sidescan system |
| | marine Technology LTD | |
| Dale Chayes | Lamont-Doherty Geo- | Sidescan system |
| | logical Observatory | |
| Ivar Bitte | Lamont | Sidescan winch operator |
| Wes Lombard | USGS | Sidescan winch operator |
| Dave Mason | USGS | Sidescan winch operator |
| Kathy Cashman | USGS | Record marker |
| Betsy Coward | USGS | Record marker |
| Sally Wood-Needell | USGS | Record marker |
| Janet Burke | USGS | Cruise curator, |
| | | record marker |
| Ken Parolski | USGS | Sidescan flyer |
| Al Goodman | USGS | Sidescan flyer |
| Ken Bayer | USGS | Sidescan flyer |

Leg 2 High-resolution seismic reflection

| Peter Popenoe | USGS | Chief scientist |
|--------------------|------|-----------------|
| Jim Dodd | USGS | Navigation |
| Ken Parolski | USGS | Elec tech |
| Wes Lombard | USGS | Record marker |
| Dave Mason | USGS | Compressor |
| Janet Burke | USGS | Cruise curator, |
| | | record marker |
| Betsy Coward | USGS | Record marker |
| Kathy Cashman | USGS | Record marker |
| Barry Irwin | USGS | Navigation |
| Sally Wood-Needell | USGS | Navigation |
| Al Goodman | USGS | Elec tech |
| Ray Hall | USGS | Record marker |
| Bob Commeau | USGS | Record marker |

Ship's crew:

Captain Don Armand First mate Barry Prada Engineer P. E. Asst. Engineer Frank Smith Cook Eddie Voss Others

Ron, Bob Timmis, Eddie, Paul,

Barry, Tommie, Jack

Purpose of cruise:

Leg 1 Sidescan sonar

- To survey with the Lamont mid-range sidescan-sonar system in the lease block areas of sale 56 in order to determine environmental conditions or hazards prior to leasing of these blocks for petroleum development.
- 2. To test the utility of the mid-range sidescan-sonar system in mapping of the shelf-edge reef system.
- 3. To examine areas of bedding terminations on the shelf and slope south of Cape Hatteras believed to be slump scars.
- To determine the utility of the sidescan-sonar system in mapping salt diapirs.

Leg 2 High-resolution seismic-reflection profiling

- To regionally access the types and frequencies of environmental 1. hazards or constraints to petroleum exploration or development in the area from Cape Hatteras to the Virginia state line.
- 2. To survey the shelf, slope, and rise on a 25-km grid as part of a regional shallow stratigraphic study.
- 3. To tie the drill holes ASP-7, -8, AMCOR 6006, and ASP-5 with one continuous line as an aid in regional stratigraphic studies.

Leg 3 High-resolution seismic-reflection profiing, Florida Shelf

1. To study the offshore extent and nature of the Florida aquifer. To study possible structure or leaks (exposures) affecting the aquifer.

Navigation techniques:

Loran-C fixes were automatically recorded at 5-minute intervals from a Northstar 6000 unit on a Texas Instrument Silent 700 terminal with cassette and paper recorder. Fixes were also manually plotted at 15-minute intervals. Satellite fixes were taken when available to aid in Loran-C adjustments. Track lines and satellite fixes were plotted on a Hewlett-Packard X-Y plotter (leg 1) and EPSCO Sea-plot II X-Y plotter. A Global Positioning (GPS) system aboard the R/V GYRE recorded fixes during periods when data could be acquired.

Scientific equipment:

Leg 1

 IST Marc 1 sidescan-sonar system: 27/30 kHz, 1 s to 4 s sweep range, up to 5 km swath width with real time slant-range correction for display.

H-P 1000 computer
TEAC-3340 tape unit
H-P 6940-B multiprogrammer
H-P 895-A power supply
H-P 7906 disc drive
IST magnetometer

2. 3.5-kHz echo-sounder, hull-mounted

Legs 2-3

- 1. 1, 5, 10, 40 in 3 airguns
- 2. Teledyne 800 joule minisparker
- 3. 3.5-kHz echo-sounder, hull-mounted (12 transducer)
- 4. EPC recorders with various amplifiers and hydrophones.
- 5. 7-channel analog tape recorder
- 6. JMR-4 Sealand Surveyor satellite survey system

Tabulated information:

Days at sea:

Leg 1 7 days, 8 hours, 15 minutes Legs 2, 3 17 days, 9 hours 9/18-25 9/26-10/8 10/9-10/14

Kilometers of data track lines:

Leg 1 335 km sidescan sonar 9/18-25
335 km 3.5-kHz
Legs 2, 3 2,050 km airgun 9/26-16/8
2,950 km 3.5-kHz .10/9-16/19

Narrative-Leg 1:

We departed Little Creek at 1045 EDT Thursday, September 18, 1980 and arrived at the northern lease block area Sale 56, Manteo Quadrangle, at 2200.

Equipment was deployed in hard rain and 2-5' seas. The sidescan system functioned well for several hours producing good records showing a number of dramatic trellis to herringbone canyon systems developed on the upper Continental Slope in the lease block area. At 0130 the sidescan system became erratic and as the technicians were unable to fix it in the onboard equipment, the fish was brought in to try bench repairs. The major problem was not found but the equipment was redeployed at 1900 for testing. The equipment functioned well for approximately one day showing a very rugged bottom and canyon system in the lease block area, before the system again quit at 1900 hours, September 20. We pulled gear for a 24-hour transit to the slump area off Cape Fear in order to repair on the way. Equipment was secured at 2020 EDT.

We arrived on location at the south end of the large lease block area, Sale 56, Cape Fear quadrangle, at 2000, September 21, and deployed the recently A broken wire had been found at the connection with the fish. fixed equipment. The equipment functioned well on the outer Blake Plateau and good records were obtained of a small slump previously found and described by the Conservation Division survey within the lease blocks. At the northern extent of the lease blocks we turned against the Gulf Stream and proceeded diagonally downslope to an area where massive, large slumps were suspected near the rise-slope boundary above a series of three salt diapirs. The slope was notable for its smoothness and lack of any bed forms until the slump area was reached. Whereupon a cliff 75 m in height previously identified from seismic data (R/V GILLISS, leg 6) came into view from downslope. The cliff trended in an upslope direction, crossed the survey track and gradually curved south to parallel the slope. We jogged west four kilometers in order to follow the scarp on our records and recorded a cliff on which bedding was clearly visible and below which large slide tracks were etched 5-10 m into the bottom, extending downslope beyond our data coverage or to lobate deposits. The cliff was followed from 1500 to 0300 EDT (12 hours) where, because of time constraints, we left it and turned north to profile salt diapirs below the slump. No problems were encountered in towing the fish south against Gulf Stream currents, and during this time, although we had about 1,700 m of water, the fish was almost directly below the ship, no doubt bent into a gentle "S" from the Gulf Stream and western boundary undercurrent.

When we turned north with the Gulf Stream, we found it very difficult to get the fish to the bottom, and had to put out 5,000 m of cable (in 2,000 m of water) to do so. The diapirs were unspectacular and without additional seismic data would probably not have been recognized. The breached diapir near 33 N., 76 W. appeared as a pockmarked bottom, perhaps due to solution of the salt. The survey was terminated at 1035 EDT, September 24. It took four hours and 10 minutes to pull the 5,000 m of cable back into the ship. Gear was secured at 1445 and we steamed for Norfolk, arriving at 1700, September 25, 1980.

In Norfolk the sidescan electronic equipment was offloaded and by 2100 the labs were emptied and cleaned. Winches and cables were left on the GYRE for offloading in Texas.

Legs 2-3:

We departed Norfolk at 1600, September 26 and arrived on line at 1955 EDT. We deployed airguns and sparker and began the seismic hazards survey, seas were 6-8° and wind blowing 20-25 kn but records with two 40-in airguns were good, showing a thick prograding Pleistocene section over a smooth and subhorizontal Pliocene near the shelf edge. A large Pleistocene-filled channel was recorded off Albemarle Sound probably marking an extension of the sound across the shelf during Pleistocene time. Seas quieted to 4-6' by 1200, September 27, but started to build again on September 29 where they reached 6-9° On September 30 through October 2 seas remained high (8-12') but records were good in spite of the high seas. Seas calmed to 6' on October 2 and by October 3 had calmed to 3-5'. Three to 7' seas were again experienced on October 4 and 6. On October 8 at 0730 we ended leg 2, having cut some planned traverse from the eastern ends of line 6-10° and one traverse from the north end This was done because we had calculated our speed to be 5 km of the survey. when planning the survey, but had only been able to average just over 4 kn and maintain good records. We pulled equipment at 0730 and steamed for Cape Canaveral.

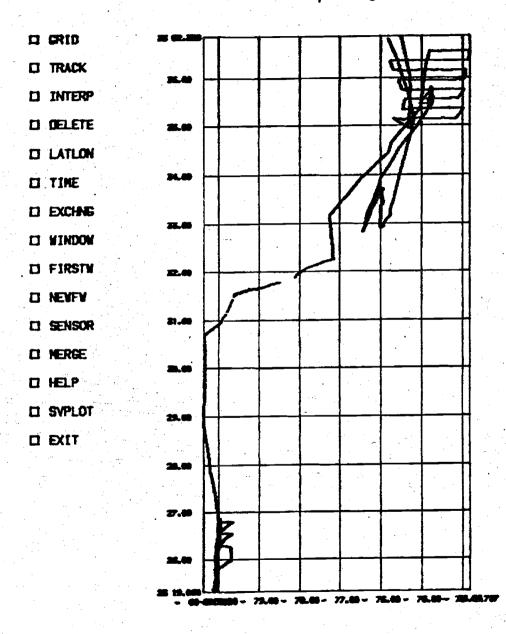
At 0730 on October 9, on checking our position, I found that we had lost considerable time in steaming due to our position with respect to the Gulf Stream. We had followed the 100-fathom contour along the Florida-Hatteras shelf all night where the Gulf Stream was quite strong and had only averaged 5 km. By moving only several miles inshore we picked up speed to 9 km and arrived off Vero Beach, Florida at 0530, October 10. We deployed equipment for leg 3 in 2-5' seas and heavy rain.

Leg 3 went well with good weather. We did not complete our planned tie to the TD-1 BC seismic line in the Bahamas because we were not getting good penetration in the Straits of Florida due to the extremely hard bottom causing very strong multiples. We substituted a second line along the Florida coast and obtained good records there, discovering a probable large sink hole off Miami Beach.

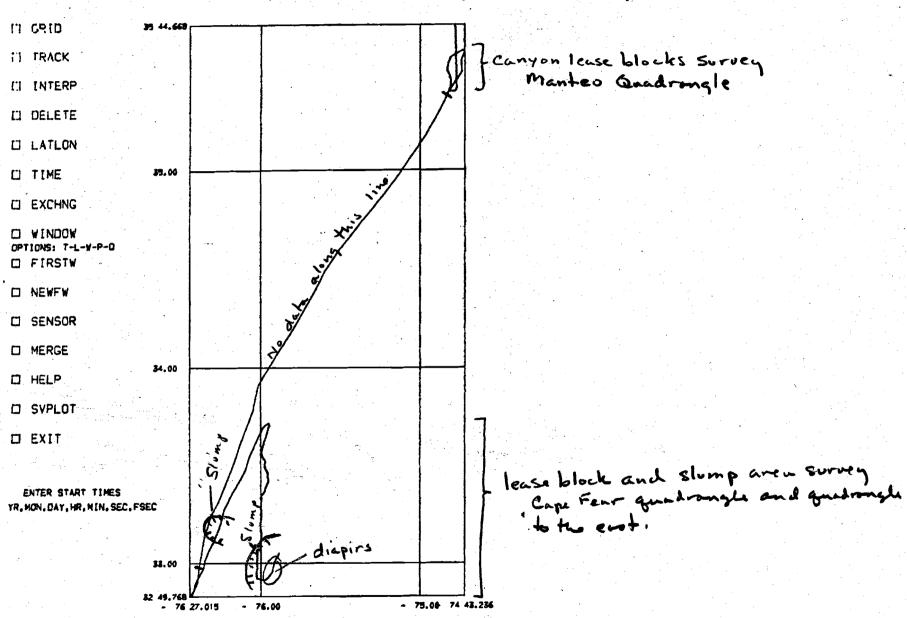
At 2315, October 13 we had completed our planned work, we pulled equipment and headed for Dodge Island, arriving at 0100, October 14.

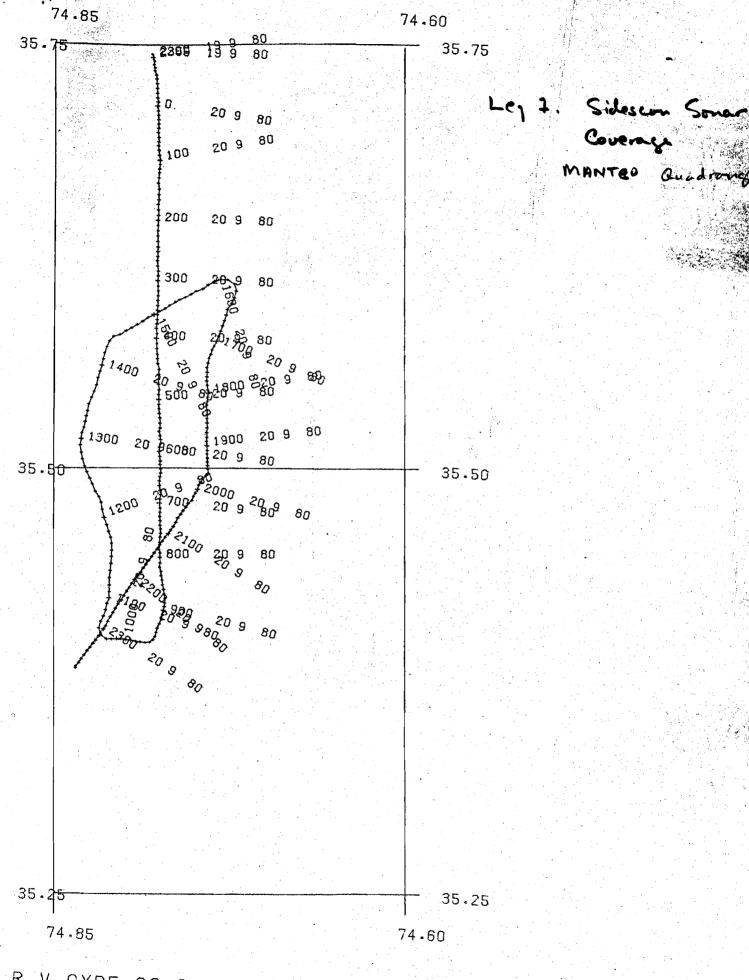
All scientific and ships crew performed well and morale was high for the cruise, in spite of its long duration. My special thanks to Captain Don Armand for a job well done. The R/V GYRE is a very well run and pleasant ship.

R.V. GYRE 80-G-9 Legs 1, 2, and 3 Tracklines

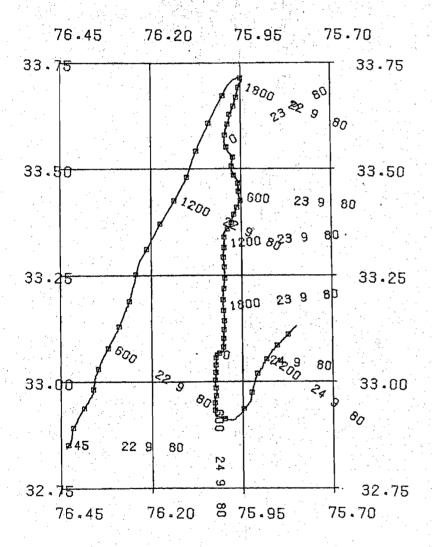


RVGYRE 80-6-9 Leg 1 Trackline Mid Range Sidescan Sonar and 3.5 kHz seismic reflection data only were taken





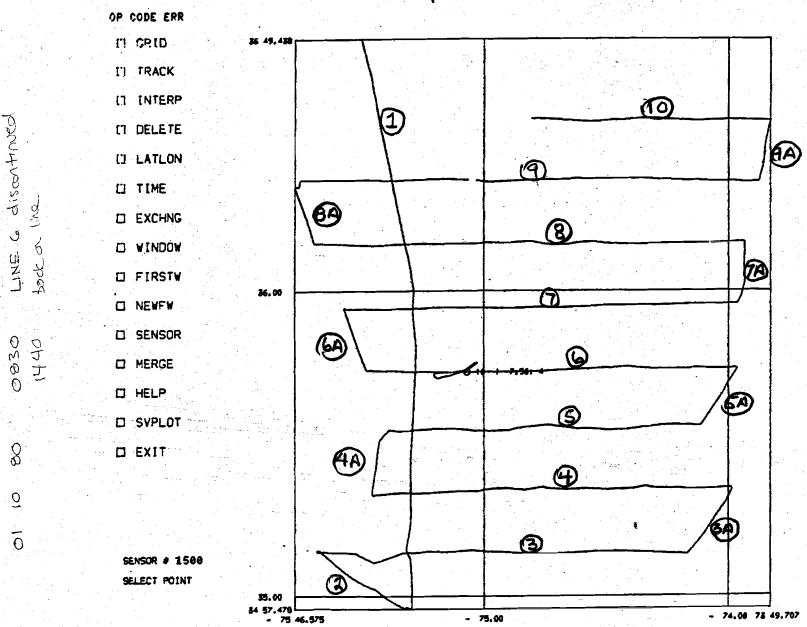
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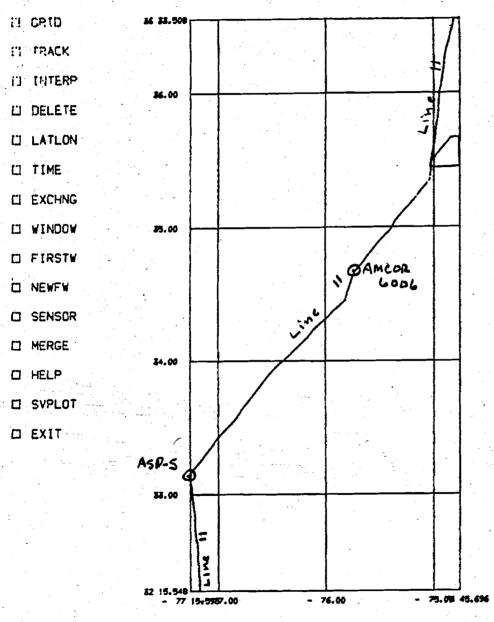
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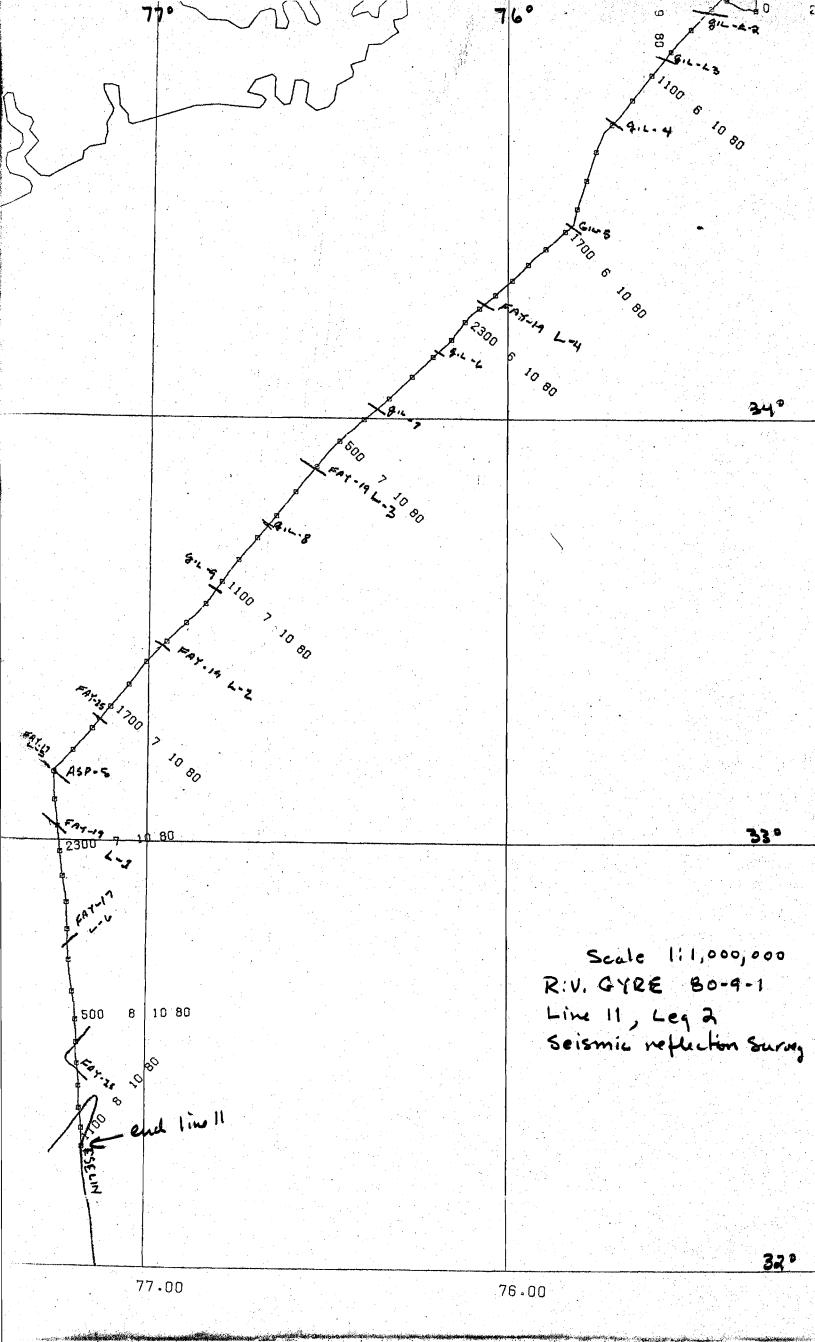
Leq 1 - Sidescon Sonar coverage, Ruperteur and
adjacent quadrongles

R.V. GYRE 80-G-9" Leg 2 Seismic reflection survey with airguns, 3.5 KHz, and mini-sparker lines 1-10



RV GYRE BO-G-9 Leg 2 Seismic Reflection survey with airguns, 3.5 kHz, and mini-sparker, Line 11





RVGYRE BO-G-9 Leg 3

Florida agnifer Survey with airguns and 3.5 KHz
Seismic Reflection
Lines WR-1 to WR-12

